CLOUD BASED PUBLIC BUS LOCATION TRACKING AND NOTIFICATION APPLICATION FOR MOBILE DEVICES

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SUPERVISOR'S DECLARATION

I hereby declare that I have checked this thesis and in my opinion, this thesis is adequate in terms of scope and quality for the award of the degree of Bachelor of Computer Science (Computer System and Networking) with Honors.

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I hereby declare that the work in this thesis is based on my original work except for quotations and citations which have been duly acknowledged. I also declare that it has not been previously or concurrently submitted for any other degree at Universiti Malaysia Pahang or any other institutions.

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ABSTRAK

Pada masa kini, pengunaan pengangkutan bas awam adalah salah satu fenomena yang biasa di Malaysia. Walau bagaimanapun, tanpa sistem pengurusan yang baik, perkhidmatan bas mungkin tidak dapat dilaksanakan secara efisien. Penumpang masih perlu menunggu lama untuk ketibaan bas di perhentian bas bersama dengan cuaca yang cukup panas dan mempunyai peluang yang tinggi terlepas bas. Oleh itu, ini adalah sistem pengesanan bas yang dibuat untuk menyelesaikan masalah tersebut. Aplikasi mudah alih berasaskan Android yang diintegrasikan dengan Google Map akan dicipta untuk menjejak lokasi bas awam dan memberikan anggaran masa ketibaan setiap bas kepada pengguna. Oleh itu, pengguna boleh pergi ke perhentian bas berdasarkan masa yang diberikan daripada menunggu di perhentian untuk bas datang. Pada masa yang sama, aplikasi mudah alih akan dicipta untuk pemandu bagi memberikan lokasi mereka kepada pengguna secara langsung dan aplikasi berasaskan web akan diwujudkan untuk syarikat bas untuk mendaftar laluan bas mereka, menguruskan pemandu mereka serta menguruskan bas yang dimiliki oleh syarikat tersebut. Keseluruhan sistem akan dibangunkan melalui kitaran RAD dan mempunyai empat fasa iaitu perancangan, perekaan sistem, pembinaan dan pemotongan fasa. Prototaip sistem dijangka dapat disiapkan setiap ulangan fasa pembinaan. Sistem ini bertujuan untuk memberikan manfaat kepada masyarakat atau orang yang sering menggunakan pengangkutan bas awam. Walau bagaimanapun, peningkatan masa depan sistem diperlukan untuk memastikan bateri telefon tidak habis begitu cepat disebabkan servis lokasi GPS dan sistem ini mungkin tidak dapat memberi manfaat kepada pengguna iOS pada peringkat awal.

ABSTRACT

Nowadays, public bus transportation had become more common in Malaysia. However, without a good management system, the bus service might not be fully utilized. Passenger still have to wait for long time under the hot weather for the bus to come and might have higher chances to miss the bus. Therefore, this is a real time bus tracking system developed to solve the problem. An Android based mobile application integrated with Google Map is created to stream the location of public buses in real time and provide estimated arrival time of each buses to the users. Hence, user can go to the bus stop based on the time given instead of waiting at the bus stop under the hot weather. At the same time, the mobile application will be created for the driver to provide their location to the user in real time and a web-based application will be created for the bus company to register their route, manage their driver as well as manage the buses that belong to the company. The whole system will be developed through the RAD cycle and having four phases which is requirement planning, user design, construction and cutover phase. The prototype of system is expected to deliver every loop of the construction phase. They system is aimed to give advantage to the community or people who often using public bus transportation. However, future enhancement to the system is needed to make sure that the phone battery does not drain so fast due to the GPS location service and the current constrain of this system is that it might not benefit to iOS users.

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LIST OF ABBREVIATIONS

A-GPS	Assisted Global Positioning System
API	Application Programming Interface
AXML	Article XML Markup Language
CPU	Central Processing Unit
CSS	Cascading Style Sheets
DBaaS	Database-as-a-service
DFD	Data Flow Diagrams
ERD	Entity Relationship Diagram
ETSI	European Telecommunication Standards
GPRS	General Packet Radio Service
GPS	Global Positioning System
GSM	Global System for Mobile
HDD	Hard Drive Disk
HTML	Hyper-Text Markup Language
HTTP	Hypertext Transfer Protocol
IC	Identity Card
ID	Identity
iOS	Iphone Operating System
IoT	Internet of Thing
IP	Internet Protocol
KML	Keyhole Markup Language
LOS	Level of Service
LRT	Light Rail Transit
LTE	Long Term Evolution
PHP	Personal Home Pages
RFID	Radio Frequency Identification
SDLC	System Development Life Cycle
SDM	System Development Methodology
SIM	Subscriber Identity Module
SMS	Short Message Service
SSD	Solid State Drives
TCQSM	Transit Capacity and Quality of Service Manual
TDMA	Time Division Multiple Access
TIFF	Time to First Fix

UI	User Interface
UML	Unified Modeling Language
Wi-Fi	Wireless Fidelity
XAML	Extensible Application Markup Language

CHAPTER 1

INTRODUCTION

1.1 BACKGROUND

Around the world, public bus services have undoubtedly play a very important role to provide transportation and mobility for community especially for those who can't afford for the ownership of car. However, public bus transportation services are not the first choice of urban travel in Malaysia. According to the Nielsen Global Survey of Automotive Demand, Malaysia ranked third in the world with 93% of car ownership. The reasons behind this is because public transport is not as attractive as private vehicle such as inflexibility, no direct access, longer travel and waiting time and unsafe when travelling (Kamarudin Ambak & Rozmi Ismail, 2012). In fact, public bus transportation does bring a lot of benefit to the community. It can help to reduce congestion, reduce air pollution as well as saving transportation fee.

The Global Positioning System (GPS) is a navigation system that use satellite technology to pinpoint or determine the geographical location of ground object. The GPS technology was initially used by United State military in early 1970s and is available for general use nowadays. GPS is currently one of the most popular navigation system which integrated in many vehicle, and mobile devices. The geographical location obtained can be manipulated to derive useful information such as best route between two points, instantaneous speed, monitoring movement and locating lost person or stolen subjects (Vermaat, 2014).

Therefore, a mobile application can be created by applying the GPS technology to solve the schedule punctuality problem and long waiting time of public buses. From the application, user will be able to get the current location and the estimated arrival time of the buses in real time, so that they can plan their journey earlier and take their time to reach the bus stop instead of spending more time waiting for the bus. At the same time

another mobile application is needed for the driver to share the bus location in real time. User may also alert bus driver that he or she is waiting at particular bus stop so that the driver is ready to stop for the fetching purpose.

According to the survey done by the Malaysian Communication and Multimedia Commission (MCMC) based on the feedback from the poll's 2787 respondents, the smartphone ownership among the internet user had reached 90.7% and 87.3% of them preferred to use mobile broadband as choice of internet access. Hence the mobile application is useful to track the location of buses anywhere, anytime and expected to give benefit to the user or passenger who often using public bus transportation thus encourage more people taking public bus transportation.

1.2 PROBLEM STATEMENT

Table 1.1 Problem statements in the project

No	Problem	Description	Effect
1.	Bus schedule provided is not accurate.	Bus company does provide bus schedule for every route, however the actual arrival time might not accurate sometimes.	The bus tends to arrive earlier or delay hence, passenger might have higher chances to miss the bus.
2.	High accident rate.	Bus driver might have to rush for the scheduled timetable could lead to serious accident happen.	Passenger feels unsafe when traveling.
3.	Long waiting time of the buses.	User might have to spend a certain amount of time waiting for the next bus to come.	User unable to predict the arrival time of the buses and have to wait for a certain period of time under the sun.

According to the Table 1.1 above, there are several problems are facing by the public bus passenger everyday life in Malaysia. One of the problems is that the bus

schedule provided is not accurate. Bus company does provide the bus schedule for every route, however the actual arrival time might not accurate sometimes. The bus tends to arrive earlier or delay, hence passenger might have higher chances to miss the bus. Besides that, passengers have to spend a certain amount of time waiting for the bus to come to the bus stop. Passenger unable to predict the arrival time of the buses and have to wait for a certain period of time under the hot weather. According to a study done by the Universiti Teknologi PETRONAS Malaysia collaboration with Gadjah Mada University Indonesia on the passengers' waiting time and punctuality of stage bus operation in Malaysia, the result showing an average punctuality index of 0.29 and expected waiting time of 28 minutes. Based on the punctuality index, by referring to the TCQSM 2003 standard the bus system service reliability is considered to LOS B, meaning that vehicles are slightly off headway (M. Napiah, I. Kamaruddin, & Suwardo, 2011). Lastly, high accident rate also one of the problems facing by the community. Passenger will fell unsafe since driver might have to rush for the scheduled timetable could lead to serious accident happen.

1.3 OBJECTIVE

The goal of this project is to develop a tracking system to convince the public bus user in Malaysia with the following objectives:

I. To develop an application for smartphone that use the GPS technology to track the actual public bus location in real time.

II. To develop an application for smartphone to notify the user the actual location of public buses with the estimated arrival time of each bus.

III. To evaluate the applications fulfil the requirements through User Acceptance Testing (UAT).

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